

WHAT IS CLAIMED IS:

1. A device having at least one active matrix panel, said active matrix panel comprising:

a substrate having an insulating surface;

5 an active matrix circuit comprising first thin film transistors formed over said substrate;

a driving circuit comprising second thin film transistors for driving said active matrix circuit;

10 a first interlayer insulating film formed over the first and second thin film transistors;

an electromagnetic shield pattern formed over said first interlayer insulating film;

a second interlayer insulating film formed over said first interlayer insulating film and said electromagnetic shield pattern; and

15 reflective pixel electrodes formed over said second interlayer insulating film and electrically connected to the first thin film transistors.

2. A device according to claim 1 wherein said electromagnetic shield functions so that said reflective pixel electrodes do not interfere with said first thin film transistors.

20 3. A device according to claim 1 wherein said reflective pixel electrodes comprise aluminum.

4. A device according to claim 1 wherein said substrate is a glass substrate.

5. A device according to claim 1 wherein the first thin film transistors are of an N-channel type.

6. A device according to claim 1 wherein each of said first and second thin film transistors is of a top-gate type.

5 7. A device according to claim 1 wherein each of said first and second thin film transistors is of a bottom-gate type.

8. A device according to claim 1 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

10

9. A head mount display using the active matrix panel according to claim 1.

10. A device according to claim 1 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

15

11. A device according to claim 1 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

12. A video camera having the active matrix panel according to claim 1.

20

13. A device according to claim 1 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

5 14. A device having at least one active matrix panel, said active matrix panel comprising:

a substrate having an insulating surface;

an active matrix circuit comprising first thin film transistors formed over said substrate;

10 a driving circuit comprising second thin film transistors for driving said active matrix circuit;

a first interlayer insulating film formed over the first and second thin film transistors;

15 at least one wiring formed on said first interlayer insulating film and electrically connected to one of source or drain of at least one of said first and second thin film transistors through a contact hole of said first interlayer insulating film;

a second interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said wiring;

20 an electromagnetic shield pattern formed over said first interlayer insulating film;

a third interlayer insulating film formed over said first interlayer insulating film and said electromagnetic shield pattern; and

reflective pixel electrodes formed over said second interlayer insulating film and electrically connected to the first thin film transistors.

09348156 " 122700

15. A device according to claim 14 wherein said electromagnetic shield functions so that said reflective pixel electrodes do not interfere with said first thin film transistors and said at least one wiring.

5 16. A device according to claim 14 wherein said reflective pixel electrodes comprise aluminum.

17. A device according to claim 14 wherein said substrate is a glass substrate.

18. A device according to claim 14 wherein the first thin film transistors are of an N-channel type.

10 19. A device according to claim 14 wherein each of said first and second thin film transistors is of a top-gate type.

20. A device according to claim 14 wherein each of said first and second thin film transistors is of a bottom-gate type.

15 21. A device according to claim 14 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

22. A head mount display using the active matrix panel according to claim 14.

09748465 122700

23. A device according to claim 14 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

5 24. A device according to claim 14 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

25. A video camera having the active matrix panel according to claim 14.

10 26. A device according to claim 14 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

15 27. A device according to claim 14 wherein said second interlayer insulating film comprises a material selected from the group consisting of polyimide, polyimide amide, polyamide, acryl, and epoxy.

28. A device according to claim 14 wherein said wiring comprises a pair of first layers comprising titanium and a second layer comprising aluminum interposed therebetween.

20 29. A device having at least one active matrix panel, said active matrix panel comprising:

a substrate having an insulating surface;

an active matrix circuit comprising first thin film transistors formed over said substrate;

a driving circuit comprising second thin film transistors for driving said active matrix circuit;

5 a first interlayer insulating film formed over the first and second thin film transistors;

at least one wiring formed on said first interlayer insulating film and electrically connected to one of source or drain of at least one of said first and second thin film transistors through a contact hole of said first
10 interlayer insulating film;

a second interlayer insulating film formed over said first interlayer insulating film and said wiring;

an electromagnetic shield pattern formed over said first interlayer insulating film;

15 a third interlayer insulating film comprising an organic resin formed over said second interlayer insulating film and said electromagnetic shield pattern; and

reflective pixel electrodes formed over said third interlayer insulating film and electrically connected to the first thin film transistors.

20 30. A device according to claim 29 wherein said electromagnetic shield functions so that said reflective pixel electrodes do not interfere with said first thin film transistors and said at least one wiring.

31. A device according to claim 29 wherein said first interlayer insulating film comprises silicon oxide.

32. A device according to claim 29 wherein said reflective pixel electrodes comprise aluminum.

33. A device according to claim 29 wherein said substrate is a glass substrate.

5 34. A device according to claim 29 wherein the first thin film transistors are of an N-channel type.

35. A device according to claim 29 wherein each of said first and second thin film transistors is of a top-gate type.

10 36. A device according to claim 29 wherein each of said first and second thin film transistors is of a bottom-gate type.

37. A device according to claim 29 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

15 38. A head mount display using the active matrix panel according to claim 29.

39. A device according to claim 29 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

40. A device according to claim 29 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

5 41. A video camera having the active matrix panel according to claim 29.

42. A device according to claim 29 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

10 43. A device according to claim 29 wherein said second interlayer insulating film comprises a material selected from the group consisting of polyimide, polyimide amide, polyamide, acryl, and epoxy.

15 44. A device according to claim 29 wherein said wiring comprises a pair of first layers comprising titanium and a second layer comprising aluminum interposed therebetween.

45. A device according to claim 29 wherein said third interlayer insulating film comprises polyimide.

46. A device having at least one active matrix panel, said active matrix panel comprising:

20 a substrate having an insulating surface;
 an active matrix circuit comprising first thin film transistors formed over said substrate;

a driving circuit comprising second thin film transistors for driving said active matrix circuit;

a first interlayer insulating film formed over the first and second thin film transistors;

5 at least one drain electrode formed on said first interlayer insulating film and electrically connected to drain of at least one of said first thin film transistors through a contact hole of said first interlayer insulating film;

10 a second interlayer insulating film formed over said first interlayer insulating film and said wiring;

an electromagnetic shield pattern formed over said first interlayer insulating film;

15 a third interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said electromagnetic shield pattern; and

20 at least one reflective pixel electrode formed over said third interlayer insulating film and electrically connected to said drain electrode through a hole opened through said third interlayer insulating film, said electromagnetic shield pattern and said second interlayer insulating film, wherein said third interlayer insulating film extends into a gap between said reflective pixel electrode and an inner edge of the opening of said electromagnetic shield pattern.

47. A device according to claim 46 wherein said first interlayer insulating film comprises silicon oxide.

25 48. A device according to claim 46 wherein said pixel electrodes comprise aluminum.

09748156 122700

49. A device according to claim 46 wherein said substrate is a glass substrate.

50. A device according to claim 46 wherein the first thin film transistors are of an N-channel type.

5 51. A device according to claim 46 wherein each of said first and second thin film transistors is of a top-gate type.

52. A device according to claim 46 wherein each of said first and second thin film transistors is of a bottom-gate type.

10 53. A device according to claim 46 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

54. A head mount display using the active matrix panel according to claim 46.

15 55. A device according to claim 46 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

20 56. A device according to claim 46 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

57. A video camera having the active matrix panel according to claim 46.

58. A device according to claim 46 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

59. A device according to claim 46 wherein said second interlayer insulating film comprises a material selected from the group consisting of polyimide, polyimide amide, polyamide, acryl, and epoxy.

60. A device according to claim 46 wherein said drain electrode comprises a pair of first layers comprising titanium and a second layer comprising aluminum interposed therebetween.

61. A device according to claim 46 wherein said third interlayer insulating film comprises polyimide.

62. A device having at least one active matrix panel, said active matrix panel comprising:

- a substrate having an insulating surface;
- an active matrix circuit comprising first thin film transistors formed over said substrate;
- a driving circuit comprising second thin film transistors for driving said active matrix circuit;
- a first interlayer insulating film formed over the first and second thin film transistors;

at least one drain electrode formed on said first interlayer insulating film and electrically connected to a drain of at least one of said first thin film transistors through a contact hole of said first interlayer insulating film;

5 a second interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said drain electrode;

at least one pixel electrode formed over said second interlayer insulating film and electrically connected to one of the first thin film transistors via said drain electrode,

10 wherein an insulating layer comprising silicon nitride is formed between said second interlayer insulating film and each of said first interlayer insulating film and said at least one drain electrode

63. A device according to claim 62 wherein said first interlayer insulating film comprises silicon oxide.

15 64. A device according to claim 62 wherein said pixel electrodes comprises aluminum.

65. A device according to claim 62 wherein said substrate is a glass substrate.

20 66. A device according to claim 62 wherein each of said first and second thin film transistors is of a top-gate type.

67. A device according to claim 62 wherein each of said first and second thin film transistors is of a bottom-gate type.

09748166-122700

68. A device according to claim 62 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

5 69. A head mount display using the active matrix panel according to claim 62.

70. A device according to claim 62 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

10 71. A device according to claim 62 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

15 72. A video camera having the active matrix panel according to claim 62.

73. A device according to claim 62 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

20 74. A device according to claim 62 wherein said second interlayer insulating film comprises a material selected from the group consisting of polyimide, polyimide amide, polyamide, acryl, and epoxy.

75. A device according to claim 62 wherein said drain electrode comprises a pair of first layers comprising titanium and a second layer comprising aluminum interposed therebetween.

5 76. A device having at least one active matrix panel, said active matrix panel comprising:

a substrate having an insulating surface;

an active matrix circuit comprising first thin film transistors formed over said substrate;

10 a driving circuit comprising second thin film transistors for driving said active matrix circuit;

a first interlayer insulating film formed over the first and second thin film transistors;

15 at least one wiring formed on said first interlayer insulating film and electrically connected to one of source or drain of at least one of said first and second thin film transistors through a contact hole of said first interlayer insulating film;

a second interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said wiring;

20 at least one pixel electrode formed over said second interlayer insulating film and electrically connected to one of the first thin film transistors,

wherein an insulating layer comprising silicon nitride is formed between said second interlayer insulating film and each of said first interlayer insulating film and said at least one wiring.

25 77. A device according to claim 76 wherein said first interlayer insulating film comprises silicon oxide.

78. A device according to claim 76 wherein said pixel electrodes comprise aluminum.

79. A device according to claim 76 wherein said substrate is a glass substrate.

5 80. A device according to claim 76 wherein each of said first and second thin film transistors is of a top-gate type.

81. A device according to claim 76 wherein each of said first and second thin film transistors is of a bottom-gate type.

10 82. A device according to claim 76 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

83. A head mount display using the active matrix panel according to claim 76.

15 84. A device according to claim 76 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

20 85. A device according to claim 76 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

86. A video camera having the active matrix panel according to claim 76.

87. A device according to claim 76 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

88. A device according to claim 76 wherein said second interlayer insulating film comprises a material selected from the group consisting of polyimide, polyimide amide, polyamide, acryl, and epoxy.

89. A device according to claim 76 wherein said wiring comprises a pair of first layers comprising titanium and a second layer comprising aluminum interposed therebetween.

90. A device having at least one active matrix panel, said active matrix panel comprising:

- a substrate having an insulating surface;
- an active matrix circuit comprising first thin film transistors formed over said substrate;
- a driving circuit comprising second thin film transistors for driving said active matrix circuit;
- a first interlayer insulating film formed over the first and second thin film transistors;
- at least one first electrode formed on said first interlayer insulating film and electrically connected to said first thin film transistors;

at least one second electrode formed on said first interlayer insulating film and electrically connected to said second thin film transistors;

5 a second interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said wiring;

at least one pixel electrode formed over said second interlayer insulating film and electrically connected to one of the first thin film transistors,

10 wherein an insulating layer comprising silicon nitride is formed on said first interlayer insulating film, said at least one first electrode and said at least second electrode.

91. A device according to claim 90 wherein said first interlayer insulating film comprises silicon oxide.

15 92. A device according to claim 90 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

93. A head mount display using the active matrix panel according to claim 90.

20 94. A device according to claim 90 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

95. A device according to claim 90 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

5 96. A video camera having the active matrix panel according to claim 90.

97. A device according to claim 90 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

10 98. A device according to claim 90 wherein said second interlayer insulating film comprises a material selected from the group consisting of polyimide, polyimide amide, polyamide, acryl, and epoxy.

99. A device having at least one active matrix panel, said active matrix panel comprising:

15 a substrate having an insulating surface;
 an active matrix circuit comprising first thin film transistors formed over said substrate;
 a driving circuit comprising second thin film transistors for driving said active matrix circuit;
20 a first interlayer insulating film formed over the first and second thin film transistors;
 at least one first electrode formed on said first interlayer insulating film and electrically connected to said first thin film transistors;

at least one second electrode formed on said first interlayer insulating film and electrically connected to said second thin film transistors;

5 a second interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said wiring;

an electromagnetic shield pattern formed on said second interlayer insulating film;

a third interlayer insulating film formed over said second interlayer insulating film and said electromagnetic shield pattern; and

10 at least one pixel electrode formed over said third interlayer insulating film and electrically connected to one of the first thin film transistors,

15 wherein an insulating layer comprising silicon nitride is formed on said first interlayer insulating film, said at least one first electrode and said at least second electrode.

100. A device according to claim 99 wherein said first interlayer insulating film comprises silicon oxide.

20 101. A device according to claim 99 wherein said device is a portable information processing terminal, which comprises a main body, an integrated circuit in the main body, said active matrix panel, a camera portion for incorporating a picture image, and an operation switch.

102. A head mount display using the active matrix panel according to claim 99.

103. A device according to claim 99 further comprising an antenna wherein said active matrix panel displays a map information received by said antenna from an artificial satellite.

5 104. A device according to claim 99 wherein said device is a portable telephone, which comprises a main body, an antenna, an audio output portion, said active matrix panel, an operation switch, and an audio input portion.

105. A video camera having the active matrix panel according to claim 99.

10 106. A device according to claim 99 wherein said device is a projector having said active matrix panel, a light source, an optical system and a screen.

107. A device having at least one active matrix panel, said active matrix panel comprising:

- 15 a substrate having an insulating surface;
 an active matrix circuit comprising first thin film transistors formed over said substrate;
 a driving circuit comprising second thin film transistors for driving said active matrix circuit;
- 20 a first interlayer insulating film formed over the first and second thin film transistors;
 at least one first electrode formed on said first interlayer insulating film and electrically connected to said first thin film transistors;

at least one second electrode formed on said first interlayer insulating film and electrically connected to said second thin film transistors;

5 an insulating layer formed on said first interlayer insulating film and covering said first electrode and said second electrode wherein said insulating film comprises silicon nitride;

a capacitor forming electrode formed on said insulating layer comprising silicon nitride to form a capacitor associated with said first thin film transistor;

10 a second interlayer insulating film comprising an organic resin formed on said insulating layer comprising silicon nitride and said capacitor forming electrode;

15 at least one pixel electrode formed over said second interlayer insulating film and electrically connected to one of the first thin film transistors.

108. A device having at least one active matrix panel, said active matrix panel comprising:

a substrate having an insulating surface;

20 an active matrix circuit comprising first thin film transistors formed over said substrate;

a driving circuit comprising second thin film transistors for driving said active matrix circuit;

a first interlayer insulating film formed over the first and second thin film transistors;

25 at least one wiring formed on said first interlayer insulating film and electrically connected to at least one of said first and second thin film transistors;

an insulating layer comprising silicon nitride formed on said first interlayer insulating film and said at least one wiring;

5 a second interlayer insulating film comprising an organic resin formed over said first interlayer insulating film and said wiring with said insulating layer interposed therebetween;

an electromagnetic shield pattern formed on said second interlayer insulating film;

10 a third interlayer insulating film comprising an organic resin formed over said second interlayer insulating film and said electromagnetic shield pattern; and

at least one pixel electrode formed over said third interlayer insulating film and electrically connected to one of the first thin film transistors.